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10/574,038	03/27/2006	Kenji Hosaka	NNA-246-B	8023

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EXAMINER

ENIN-OKUT, EDU E

ART UNIT	PAPER NUMBER
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1795

NOTIFICATION DATE	DELIVERY MODE
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12/16/2008

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/574,038	Applicant(s) HOSAKA ET AL.	
	Examiner Edu E. Enin-Okut	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 May 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 May 2008 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>5/18/06, 7/3/06</u> . | 6) <input type="checkbox"/> Other: _____ |

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**BIPOLAR ELECTRODE BATTERIES AND METHODS OF MANUFACTURING BIPOLAR
ELECTRODE BATTERIES**

Priority

1. Acknowledgment is made of Applicant's claim for foreign priority to Japanese Patent Application Nos. 2004-354526 and 2005-315147, filed on December 7, 2004 and October 28, 2005, respectively, under 35 U.S.C. 119(a)-(d). Certified copies of those applications have been received.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-6, 8 and 10-11 are rejected under 35 U.S.C. 102(b) as being anticipated by Munshi (US 6,664,006).

Regarding claims 1-6 and 8, Munshi discloses stacked solid-state electrochemical cells and batteries [bipolar electrode stack] employing very thin film, highly conductive polymeric electrolyte 70 and very thin electrode structures 20, 60 [anode, cathode] (Abstract; 9:36-40, 25:35-57, 29:6-8; Figs. 1B, 1C, 2, 3). A polymer substrate current collector 12,13,40, formed of polyester (PET), polypropylene (PP), polyethylene naphthalate (PEN), polyethylene (PE), polyvinylidene fluoride (PVDF), polycarbonate (PC), polyphenylene sulfide (PPS) and polytetrafluoroethylene (PTFE), is disposed between the anode material 20 and cathode material 60, as shown in Fig. 2 (21:66-22:8, 22:18-27, 25:35-46, 26:6-24; Figs. 1B, 1C, 2, 3). Alternatively, the polymer substrate may also be impregnated with an electronically conductive element that is inert to the active electrode, such as conductive carbon black, electronically conducting polymers (e.g., polyacetylene, polypyrrole, polyaniline, etc.), or a finely ground, dispersed

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metal impregnated into the polymer substrate (22:28-43, 26:11-14). The opposite ends of the electrochemical cells have a layer of metal sprayed onto them to serve as battery terminations 102a, 102b [electrode extracting plate] (25:46-49; Fig. 2).

Regarding claims 10-11, Munshi discloses that the batteries can be stacked in rectangular prismatic modules [battery module] and may be used as a cost-effective power source for an electric vehicle (6:33-44, 29:30-34). The remaining limitations recited in claim 10 have been addressed above with respect to claim 1.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Munshi as applied to claims 1-6, 8 and 10-11, and further in view of Hwang et al. (US 2005/0084760).

Munshi is applied and incorporated herein for the reasons above.

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Regarding claim 7, Munshi does not expressly teach that the high-polymer material exhibits a weight average molecular weight of from about 50,000 Daltons to about 1 million Daltons.

Hwang teaches a battery that includes a current collector having a polymer film with a metal deposited on the polymer film (Abstract; para. 12). The polymer film has a rigid characteristic which keeps it from stretching during the rolling step of the battery fabrication process while still having sufficient flexibility to be rolled during the fabrication process (para. 13). The polymer may be a polyethylene terephthalate, polyimide, polytetrafluoroethylene, polyethylene naphthalene, polyvinylidene fluoride, polyethylene naphthalate, polypropylene, polyethylene, polyester, or polysulfone (para. 13). The polymer has a molecular weight of 10,000 to 7,000,000, and preferably 50,000 to 5,000,000 (para. 13).

Since it has been held that obviousness exists where the claimed ranges overlap or lie inside ranges disclosed by the prior art (e.g., *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990)), it would have been obvious to one of ordinary skill in the art at the time of the invention to form the collector of Munshi using a polymer with a weight as recited by the claim because Hwang teaches that polymers with weight within that range produce a strong, but flexible, film. See MPEP 2144.05 (I).

7. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Munshi in view of Usui et al. (US 6,656,232).

Munshi is applied and incorporated herein for the reasons above.

Regarding claim 9, Munshi teaches that opposite ends of its electrochemical cells have a layer of metal sprayed onto them to serve as battery terminations, as discussed above.

Munshi does not expressly teach that the sprayed metal forms a metal foil.

Usui teaches a method of manufacturing of a battery electrode (Title). The reference discusses that producing an electrode including a metal sprayed layer on one side of the electrode on which to weld

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the lead piece, a method of depositing metal foil in advance for reinforcement, etc., to improve the electric conductivity of a material core portion (1:41-48).

It would have been obvious to one of ordinary skill in the art at the time of the invention to form the electrode extracting plate of Munshi by depositing a metal foil because Usui teaches that it is a method with which to produce an electrical contact within a battery.

8. Claims 12-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Munshi in view of Hopkins et al. (US 2004/0001998).

Munshi is applied and incorporated herein for the reasons above.

Regarding claims 12-15 and 18-20, Munshi teaches the composition of a bipolar battery as discussed above in paragraph 5.

Munshi also teaches methods of making a thin bipolar battery (16:3-48; Claim 47) composed of laminating tightly together at least one layer of bipolar unit between a layer of first anode and a layer of first cathode to provide a stack having laminar ends (16:5+8). A bipolar unit includes a flexible first polymer substrate, optionally including an electrically conductive material, with two opposite sides, two opposite edges, and two metallization layers coating each said side of the substrate (16:8-20). The bipolar unit also includes a second anode layer overlying one metallization layer, a second cathode layer overlying the other metallization layer, and a layer of solid polymer electrolyte overlying at least one of the second anode and the second cathode (16:16-20, 16:24-26). Each of a first anode layer and a first cathode layer overlies a metallic or a metallized polymer current collector (16:28-34). A solid polymer electrolyte layer overlies the first anode layer (16:34-36). In making up the bipolar battery, the first anode and first cathode are oriented such that the first anode layer opposes the second cathode layer of a bipolar unit, with a layer of solid polymer electrolyte disposed between the first anode and second cathode (16:40-47). The process of making the battery also includes applying current collectors to the laminar

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surfaces (16:47-48). The opposite ends of the bipolar unit have a layer of metal sprayed onto them to serve as battery terminations 102a, 102b (25:46-49; Fig. 2). Batteries can be stacked in rectangular prismatic modules and may be used as a cost-effective power source for an electric vehicle (6:33-44, 29:30-34).

However, Munshi does not expressly teach the use of an inkjet printing method; or, that the method is a piezoelectric printing method; or, the curing the high polymer material.

Hopkins teaches a battery made by drop on demand printing a first electrode pattern and a second electrode pattern, and applying an electrolyte region over a portion of the first electrode pattern and a portion of the second electrode pattern (Abstract). A drop on demand drop emitting printhead, used to emit fluid drops of electrode forming liquids onto a carrier medium, can be composed of a piezoelectric printhead similar to thermal or piezoelectric drop emitting printheads (para. 9-12). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a piezoelectric inkjet printing method to apply the electrodes of the bipolar battery of Munshi because Hopkins teaches that inkjet printing methods can produce small batteries with different configurations for use in portable devices that continue to reduce in size (see Hopkins, para. 2).

Regarding claims 16-17, neither Munshi nor Hopkins expressly teaches the curing the high polymer material; or, that the curing is carried out using thermal curing or radiation curing.

However, Munshi does teach use of radiation, electron beam, thermal and ultraviolet curing methods for the preparation of interpenetrating polymeric networks (IPN) containing various types of polyacrylates and liquid organic solvents (5:5-11; Claims 44, 47). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to cure the high polymer of the collector formed using the method of Munshi, as modified by Hopkins, because Munshi teaches that curing can create interpenetrating polymeric networks and, in turn, increase the strength of the resulting collector.

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Double Patenting

9. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

10. Claims 1, 12 and 18-19 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-2, 11 and 19-20 of copending Application No. 11/936,159. Although the conflicting claims are not identical, they are not patentably distinct from each other because claims 1, 12 and 18-19 of the instant application encompass claims 1-2, 11 and 19-20 of Application No. 11/936,159. Therefore, claims 1-2, 11 and 19-20 of Application No. 11/936,159 anticipate the limitations recited in instant application claims 1, 12 and 18-19.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

11. Claims 1 and 8-11 provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 5, 16-17 and 19-21 of copending Application No. 11/946,177 in view of Munshi (US 6,664,006).

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Claims 1, 5, 16-17 and 19-21 of Application No. 11/946,177 teaches the components of the bipolar battery stack as recited in claims 1 and 8-11 of the instant application. However, Application No. 11/946,177 does not expressly teach that the collector comprises a high-polymer material.

Munshi teaches that stacked solid-state electrochemical cells and batteries [bipolar electrode stack] employ a polymer substrate current collector 12,13,40, formed of polyester (PET), polypropylene (PP), polyethylene naphthalate (PEN), polyethylene (PE), polyvinylidene fluoride (PVDF), polycarbonate (PC), polyphenylene sulfide (PPS) and polytetrafluoroethylene (PTFE), is disposed between an anode material 20 and cathode material 60, as shown in Fig. 2 (21:66-22:8, 22:18-27, 25:35-46, 26:6-24; Figs. 1B, 1C, 2, 3), as discussed above.

It would have been obvious to form the collector of Application No. 11/946,177 of the high-polymer of Munshi to form a highly flexible collector resistant to damage during manufacture of a battery (see Munshi, 22:63-23:4).

This is a provisional obviousness-type double patenting rejection.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Rippel et al. (US 4,275,130) teaches a lightweight, bipolar battery construction for lead acid batteries in which a plurality of thin, rigid, biplates each comprise a graphite fiber thermoplastic composition in conductive relation to lead stripes plated on opposite flat surfaces of the plates, and wherein a plurality of nonconductive thermoplastic separator plates support resilient yieldable porous glass mats in which active material is carried, the biplates and separator plates with active material being contained and maintained in stacked assembly by axial compression of the stacked assembly.

Correspondence / Contact Information

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Edu E. Enin-Okut** whose telephone number is **571-270-3075**. The examiner can normally be reached on Monday - Thursday, 7 a.m. - 3 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on 571-272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Edu E Enin-Okut/
Examiner, Art Unit 1795

/Dah-Wei D. Yuan/
Supervisory Patent Examiner, Art Unit 1795